

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No.30

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte KOICHI SANO, HIROYUKI SEKIGUCHI and TETSUO YOKOYAMA

Appeal No. 1997-1655
Application 07/797,893¹

HEARD: November 16, 1999

Before HAIRSTON, JERRY SMITH and FRAHM, Administrative Patent Judges.

FRAHM, Administrative Patent Judge.

DECISION ON APPEAL

Appellants have appealed to the Board from the examiner's final rejection of claims 13 to 21, which constitute all of the pending claims in the application before us. Claims 1 to 12 have been canceled. Claim 21 stands allowed as indicated by the examiner at the bottom of page 1 of the

¹ Application for patent filed November 26, 1991. Appellants rely upon a foreign priority filing date under 35 U.S.C. § 119 of November 28, 1990.

Answer. Accordingly, claims 13 to 20 are before us for consideration on appeal.

BACKGROUND

The subject matter on appeal is directed to a method for three-dimensionally displaying an image (e.g., a medical image such as that from an MRI, X-ray, CT, etc.) by operating on voxel data, where voxel data is three-dimensional image data expressed by a set of small cubes called voxels (see specification, page 1; Brief, page 3). More specifically, the method involves processing three-dimensional data from a plurality of cross-sectional images which are scanned in by a medical diagnosing apparatus (i.e., MRI, X-ray, CT, etc.)(see specification, page 1; Brief, page 3). As indicated in the specification (pages 6 to 8), a prior art manual region extracting method is known to be employed in order to extract a designated organ from three-dimensional medical image or voxel data to three-dimensionally display the designated organ. Appellants recognized that extraction of such a large amount of voxel data such as is associated with an organ is not practical in the clinical field, and a real-time executable method would be better (see specification, page 6). As recognized by appellants, conventional manual extraction techniques suffer from the disadvantage that it is difficult to completely extract a region of interest (such as an organ), and in order to "always obtain a clinically adequate image, the interposition of an operator is inevitable in the procedure of extraction" (see specification, page 8). Thus, a key difference between the prior art and the invention recited in representative independent claim 13 on appeal is that in the recited invention display and editing of image data occurs

"in a realtime

manner" as data is being automatically extracted and expanded, allowing for operator viewing and editing of the image during, as opposed to after (as in the prior art), the extraction and expansion process.

In general, appellants' invention recited in representative independent claim 13 on appeal provides a method for displaying a three-dimensional image using a region extracting process which automatically performs extraction and expansion steps on voxel data, wherein the processed image is displayed "in a realtime manner simultaneously with repetitions of said expansion substep" (claim 13 on appeal, last paragraph). By displaying images in a realtime manner during the expansion substep, the method of claim 13 is able to monitor the sequential change of extracted regions after each repetition of the expansion substep, thereby monitoring the expansion process (Brief, page 7). As further discussed, infra, we find that the applied references to Crawford ('148 and '202) and Robb fail to teach or suggest at least this salient feature as it is recited in the claims on appeal.

Representative claim 13 is reproduced below:

13. A method for displaying region extracting processing in an image processing system to perspectively project 3-dimensional voxel data onto a 2-dimensional display, said method comprising the steps of:

executing a connected region expanding process onto 3-dimensional voxel data of an object to extract a region corresponding to a substructure of said object from said 3-dimensional voxel data, said connected region expansion process starting from a seed voxel and including automatic repetitions of an expansion substep wherein a plurality of voxels are incorporated into extracted voxels on the condition that said voxels are adjacent to previously incorporated voxels and satisfy expansion criteria;

executing 3-dimensional perspective projection process onto extracted voxels after each repetition of said expansion substep is completed to generate and renew image data for a perspective projection image successively; and

displaying the perspective projection image onto the 2-dimensional display in a realtime manner simultaneously with repetitions of said expansion substep.

The following references are relied on by the examiner:

Crawford (Crawford '202)	4,903,202	Feb. 20, 1990
Crawford (Crawford '148)	4,905,148	Feb. 27, 1990

Robb et al (Robb), "Interactive Display and Analysis of 3-D Medical Images," IEEE Transactions on Medical Imaging, Vol. 8 no. 3, September 1989, pages 217-226.

The rejection of claim 21 under 35 U.S.C. § 112, first paragraph, as lacking adequate written description, has been withdrawn (see Answer, pages 1 and 2).²

The rejection of claims 13 to 15, 17, and 18 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter regarded as the invention has been withdrawn (see Answer, page 2).

Claims 13 to 19 stand rejected under 35 U.S.C. § 103. As evidence of obviousness, the

² The Answer states that "Claim 21 is allowed" (Answer, page 1).

examiner relies upon Crawford '148 in view of Robb.

Claim 20 stands rejected under 35 U.S.C. § 103. As evidence of obviousness, the examiner relies upon Crawford '148 in view of Robb, and further in view of Crawford '202.

Rather than repeat the positions of appellants and the examiner, reference is made to the Brief and the Answer for the respective details thereof.³

OPINION

For the reasons generally set forth by appellants' in the Brief, and for the reasons which follow, we will reverse the rejection of claims 13 to 20 under 35 U.S.C. § 103.

In reaching our conclusion on the issues raised in this appeal, we have carefully considered appellants' specification and claims, the applied patents, and the respective viewpoints of appellants and the examiner. As a consequence of our review, we are in general agreement with appellants that the applied references would not have taught or suggested the method of appellants' claim 13 to 20 on

³ We note that the after final amendment dated May 16, 1995, has not been entered as per the Advisory Action of May 26, 1995. The after final amendment dated September 5, 1995, amending claims 13, 17, and 21, has been entered.

Our review of the file wrapper in this case indicates that the Reply Brief of January 30, 1996, has not been entered by the examiner as indicated in the letters from the examiner dated February 15, 1996, and April 9, 1996, as well as the Group Director's decision on petition dated January 10, 1997.

appeal. For the reasons which follow, we will reverse the decision of the examiner rejecting claims 13 to 20 under 35 U.S.C. § 103.

Appellants argue (Brief, pages 6 to 8) that Crawford '148 and Robb fail to teach or suggest the recited feature of displaying a three-dimensional image using a region extracting process which automatically performs extraction and expansion steps on voxel data, wherein the processed image is displayed "in a realtime manner simultaneously with repetitions of said expansion substep" (claim 13 on appeal, last paragraph). We agree, and we find that the feature

recited in claims 13 to 20 on appeal, of executing "automatic repetitions" of an "expansion substep" while displaying an image "in a realtime manner" during or simultaneously with the repetitions of the expansion substep (independent claims 13 and 16), is neither taught nor would have been suggested by the applied prior art. By displaying images in a realtime manner during the expansion substep, the method of claim 13 is able to monitor the sequential change of extracted regions after each repetition of the expansion substep, thereby monitoring the expansion process and overcoming the disadvantage of the prior art (Brief, page 7).

We are in agreement with appellants (Brief, page 8) that the "on the fly" language of Robb (see Robb, page 221, column 2) fails to teach or suggest the salient feature of claims 13 to 20 as discussed above. Specifically, we find that Robb's "on the fly" voxel operation occurs "during the projection

process" (Robb, page 221, column 2), which we find occurs after the expansion or extraction process.

In contrast, appellants' invention recited in claim 13 operates in a realtime manner to display data during the expansion process.

The examiner asserts in the Answer (page 8) that it would have been obvious to display the extracted data as soon as it is determined (simultaneously or during the expansion substep) in order to allow the operator to see some of the results without having to wait for all of the data to be processed. We note that judgements on obviousness are in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was

within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicants' disclosure, such a reconstruction is proper. See In re McLaughlin, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). We find that the reasoning of the obviousness rejection in the rejection took into account knowledge gleaned only from appellants' disclosure. Specifically, one would have to look to appellants' disclosure for direction to display and/or edit extracted image data in a realtime manner during the expansion substep. As stated by appellants at page 12 of their specification, this allows the extraction process to be more efficiently and accurately performed, as well as allowing the display to be "immediately reflected to the 3D perspective projection

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display, so that it is possible to easily decide whether or not the result of the editing is proper"

(specification, page 12).

In view of the foregoing, the decision of the examiner rejecting claims 13 to 20 under 35 U.S.C. § 103 is reversed.

CONCLUSION

The decision of the examiner rejecting claims 13 to 19 under 35 U.S.C. § 103 over Crawford '148 in view of Robb is reversed.

The decision of the examiner rejecting claim 20 under 35 U.S.C. § 103 over Crawford '148 in view of Robb and Crawford '202 is reversed.

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REVERSED

KENNETH W. HAIRSTON)	
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)	
)	BOARD OF PATENT
JERRY SMITH)	
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)	
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